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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/772,743	02/04/2004	Akiko Kitami	04075/LH	6817

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EXAMINER	
GARCIA JR, RENE	

ART UNIT	PAPER NUMBER
2853	

DATE MAILED: 12/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/772,743	KITAMI ET AL.
	Examiner	Art Unit
	Rene Garcia, Jr.	2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,10-17 and 22-24* is/are rejected.

7)☒ Claim(s) *6-9 and 18-21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *14 May 2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-5, 10-17 and 22-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Takahashi (US 6,099,103).

Takashi discloses the following claimed limitations:

*regarding claims 1 and 13, droplet ejection apparatus/**600**/ comprising: (ABS)

*drive signal generator/**pulse generator, 120 & 122**/ (fig. 6) for generating a set of drive signals including a plurality of drive pulses (fig. 1; col. 7, lines 6-26)

*drive pulse selector for selecting a set of drive pulses in accordance with a print datum of each pixel (col. 10, lines 15-28)

*head (know art) for ejecting a droplet (ABS) from a nozzle/**618**/ provided corresponding to a channel/**613**/, by changing a volume of the channel (613a & 613e; fig. 9) according to the set of drive pulses selected (col. 1, line 60 – col. 2, line 9)

*wherein, the drive signal includes a micro-vibration pulse/**drop down sizing pulse**/ as one of the drive pulses to generate a micro-vibration of meniscus in the nozzle in such a degree that the droplet is not ejected (col. 9, line 21-25; signal B [drop downsizing pulse] & col. 7, lines 16-18), said micro-vibration pulse being formed of a rectangular wave which include at least one micro-vibration pulse having a pulse width of (2n) AL, where AL is 1/2 of the acoustic

resonance/T/ (col. 2, lines 10-15 period of the channel, and n is an integer not smaller than 1 (fig. 5)

*regarding claims 2 and 14, rectangular wave having a pulse width of 2 AL (fig. 5; col. 9, lines 21-25 W_b)

*regarding claims 3 and 15, rectangular wave/W_b/ having a pulse width of 1 AL and a rectangular wave/W_a/ having a pulse width of 2 AL (fig. 5; col. 9, lines 21-25)

*regarding claims 4 and 16, micro-vibration pulse/**pulse B**/ is applied before an ejection pulse/**pulse A2**/ for ejecting the droplet is applied (fig. 3)

*regarding claims 5 and 17, rectangular wave having a pulse width of (2n) AL is applied at the last timing of the micro-vibration pulse (fig. 1)

*regarding claims 10 and 22, head comprises an electric-mechanical conversion element/**piezoelectric material**/ (col. 1, lines 27-34) which changes the volume of the channel by the application of at least one of the ejection pulse or the micro-vibration pulse (col. 1, lines 10-26)

*regarding claims 11 and 23, electric-mechanical conversion element/**piezoelectric material**/ (col. 1, lines 27-34) comprises a piezoelectric material which forms a partition wall

between adjacent channels, and which is deformed in a shearing mode by applying a voltage (col. 1, lines 10-34)

*regarding claims 12 and 24, droplet is an ink droplet (ABS)

Allowable Subject Matter

3. Claims 6-9 and 18-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. The following is a statement of reasons for the indication of allowable subject matter:

The primary reason for the allowance of claim 6 is the inclusion of the limitations being for a droplet ejection apparatus that ejection pulse is applied after 1 AL from the time when the rectangular wave having the pulse width of (2n) AL is applied at the last timing of the micro-vibration pulse. It is this limitation found in each of the claims, as they are claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claim 7 is the inclusion of the limitations being for a droplet ejection apparatus that first pulse formed of a rectangular wave to expand the volume of the channel, and 1 AL later, restoring it to an original state; second pulse formed of a rectangular wave to reduce the volume of the channel, and a prescribed period later, restoring it to the original state; and wherein a voltage of the first pulse Von is higher than a voltage of the second pulse Voff. It is these limitations found in each of the claims, as they are claimed in the

combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claim 9 is the inclusion of the limitations being for a droplet ejection apparatus that maximum extrusive amount of the meniscus by the micro-vibration pulse is not larger than a radius of the nozzle. It is these limitations found in each of the claims, as they are claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claim 18 is the inclusion of the method steps being ejection pulse is applied after 1 AL from the time when the rectangular wave having the pulse width of (2n) AL is applied at the last timing of the micro-vibration pulse. It is this step found in each of the claims, as they are claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claim 19 is the inclusion of the method steps first pulse formed of a rectangular wave to expand the volume of the channel, and 1 AL later, restoring it to an original state; second pulse formed of a rectangular wave to reduce the volume of the channel, and a prescribed period later, restoring it to the original state; and wherein a voltage of the first pulse Von is higher than a voltage of the second pulse Voff. It is these steps found in each of the claims, as they are claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

The primary reason for the allowance of claim 21 is the inclusion of the method step being maximum extrusive amount of the meniscus by the micro-vibration pulse is not larger than a radius of the nozzle. It is this step found in each of the claims, as they are claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Takahashi (US 5,736,994) discloses a method of driving an ink-jet apparatus comprising an ink chamber filled with ink, and actuator for changing the volume of the ink chamber, and a control unit which causes a pressure wave to develop in the ink chamber by applying a first pulse signal to the actuator so as to increase the volume of the ink chamber, and which causes the volume of the ink chamber to be decreased from the increased state to the original state after a lapse of time T. Ishikawa (US 6,350,003) discloses an ink droplet ejecting method and apparatus, wherein, after a driving waveform for a primary ejection of ink, only one additional pulse is added, thereby making it possible to obtain an ink droplet of a desired volume.

Communications with the USPTO

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rene Garcia, Jr. whose telephone number is (571) 272-5980. The examiner can normally be reached on M-F 8:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Rene Garcia Jr
09 December 2005

12/05
K. FEGGINS
PRIMARY EXAMINER